

INFORMAL DRAWING
 Sheet 1 of 11

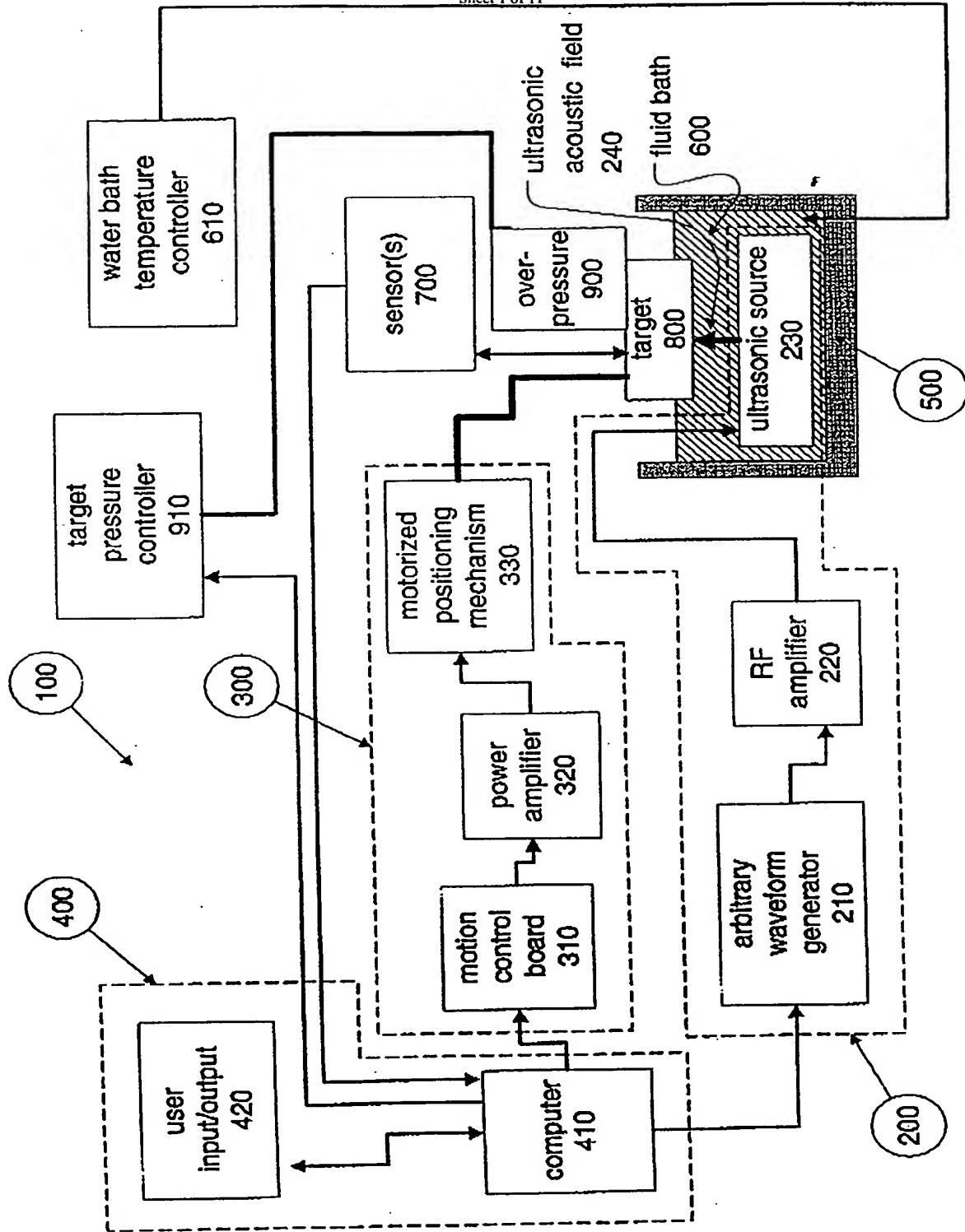


Figure 1

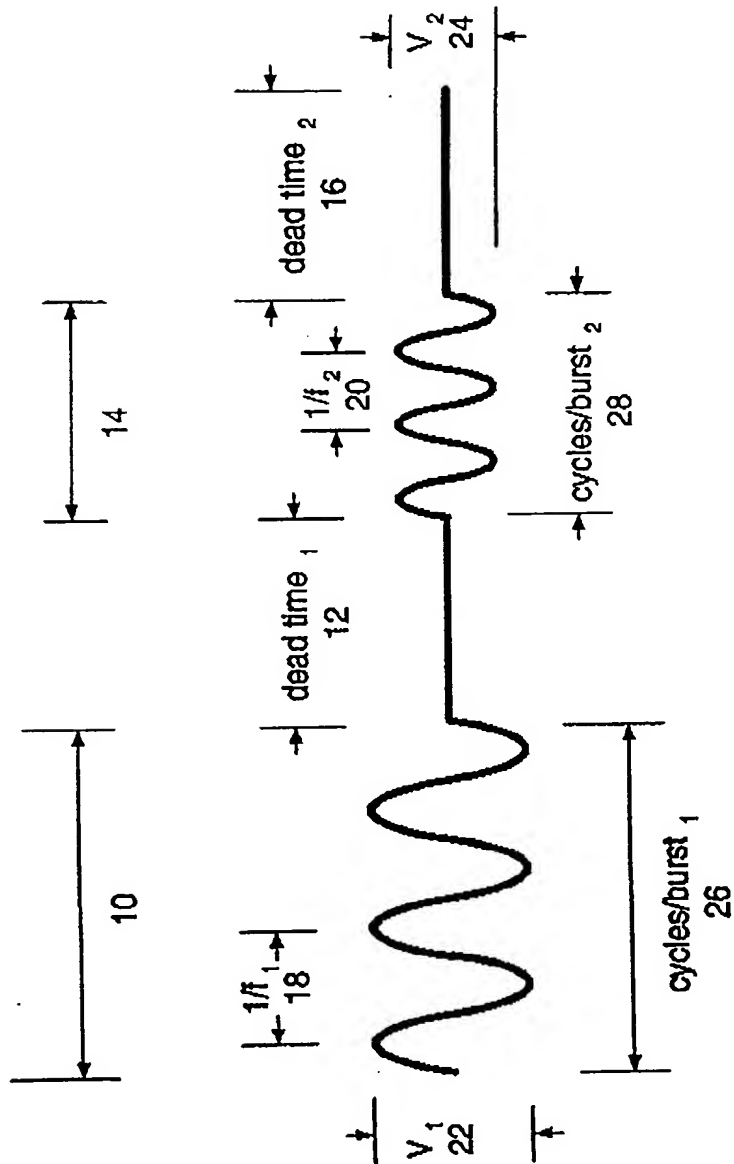


Figure 2

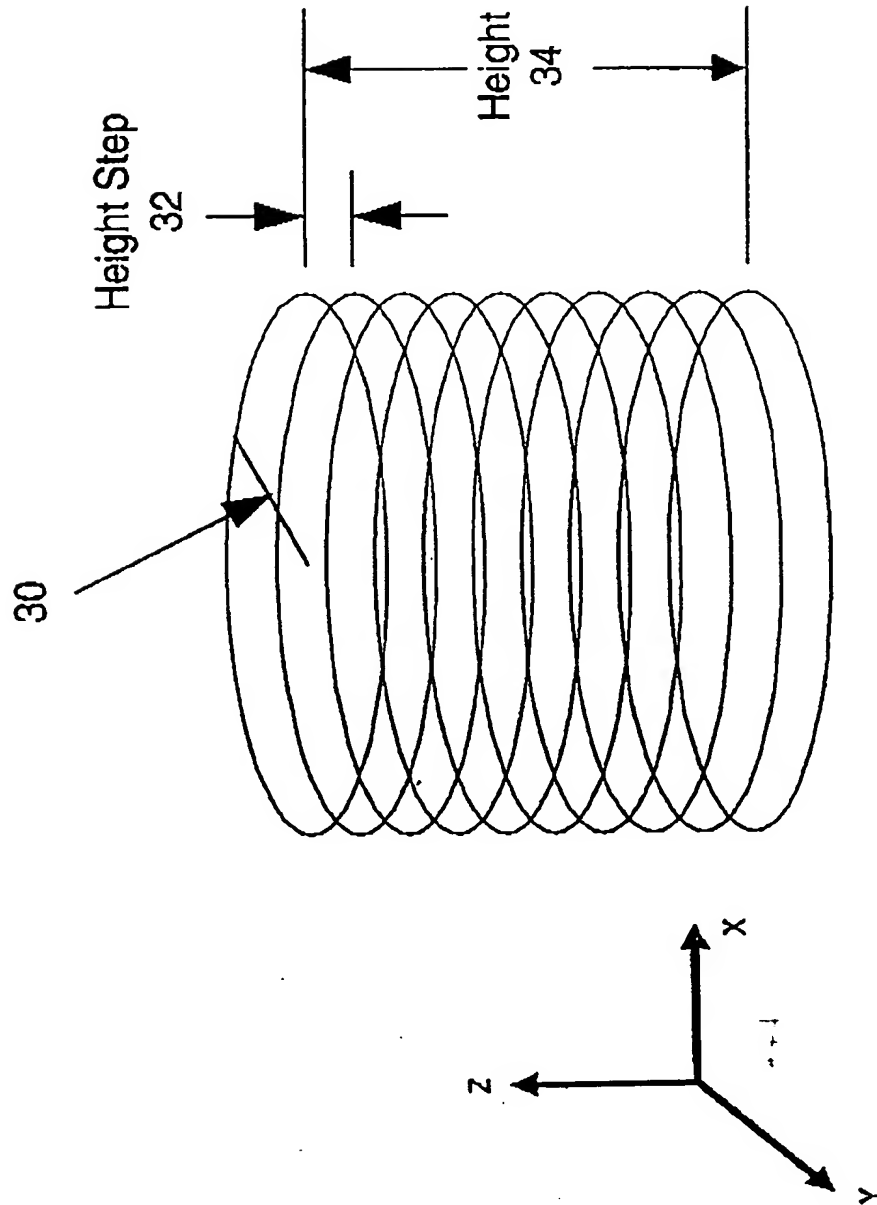


Figure 3

treatment
vessels

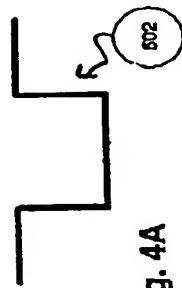


Fig. 4A

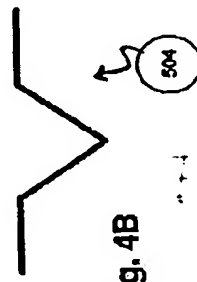


Fig. 4B

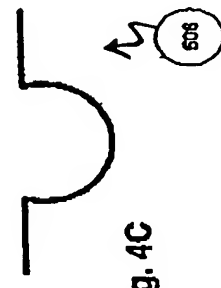


Fig. 4C

pre-treatment
assembly

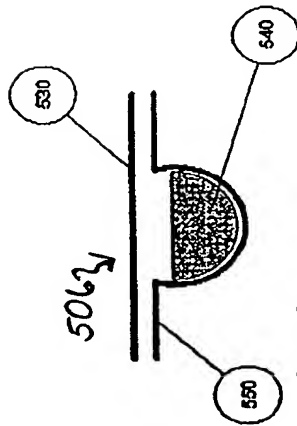


Fig. 5A

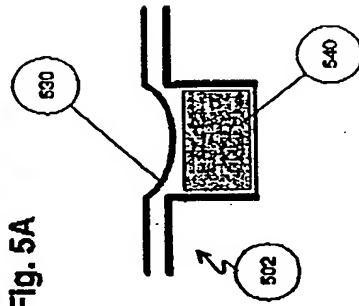


Fig. 5B

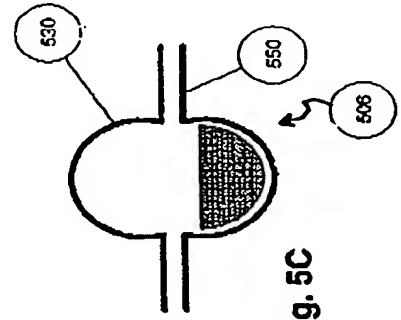


Fig. 5C

post-treatment
transfer

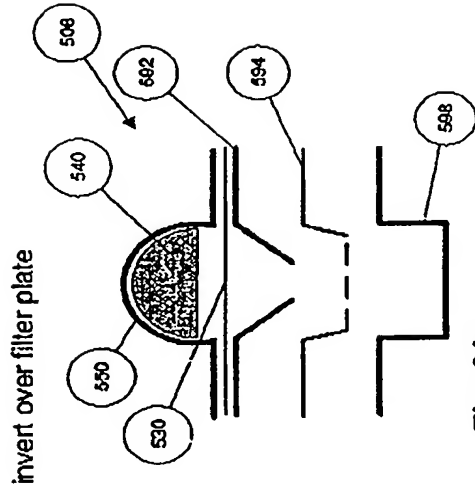


Fig. 6A

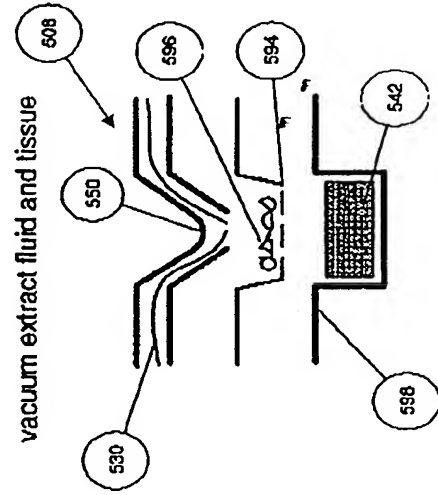


Fig. 6B

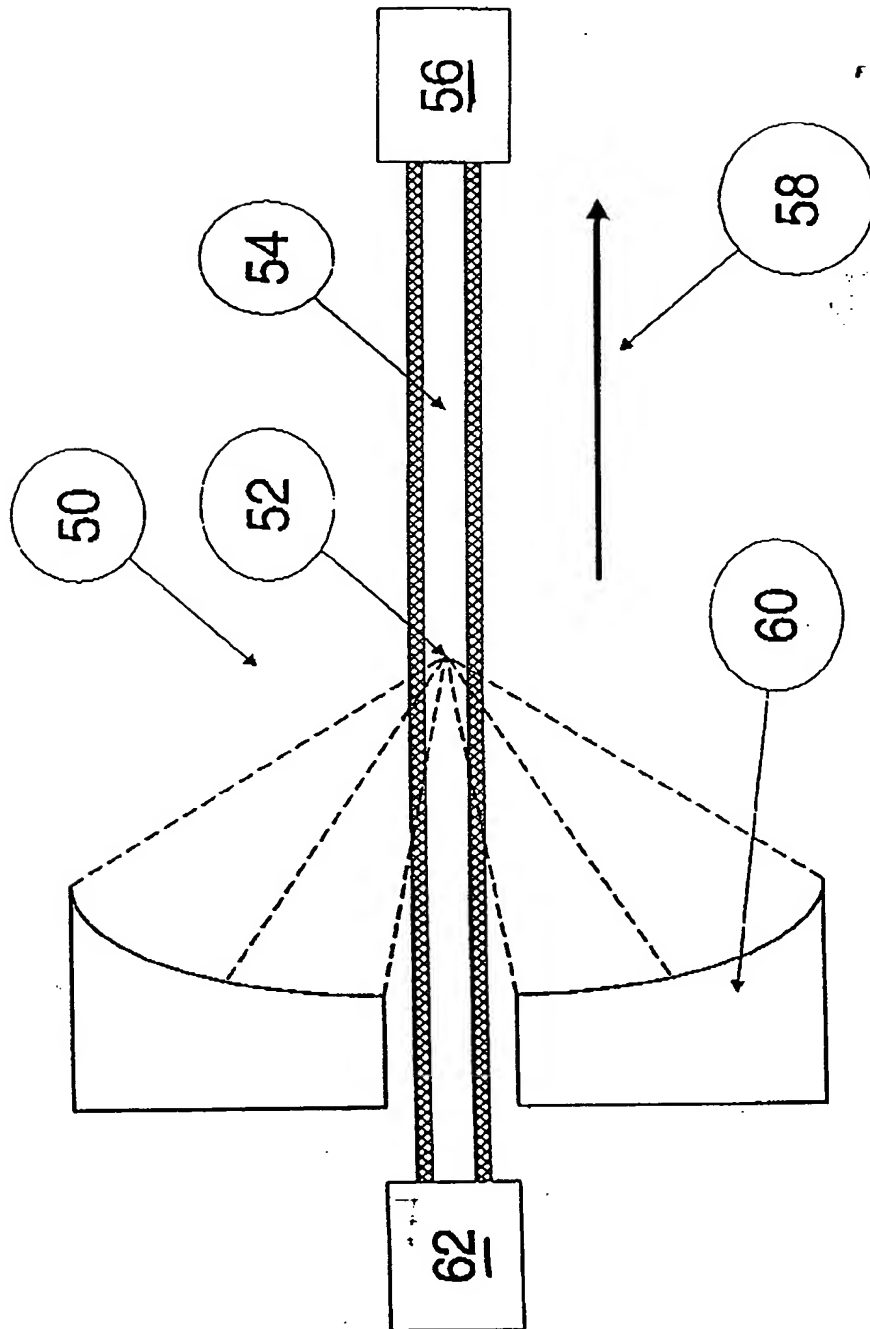


Figure 7

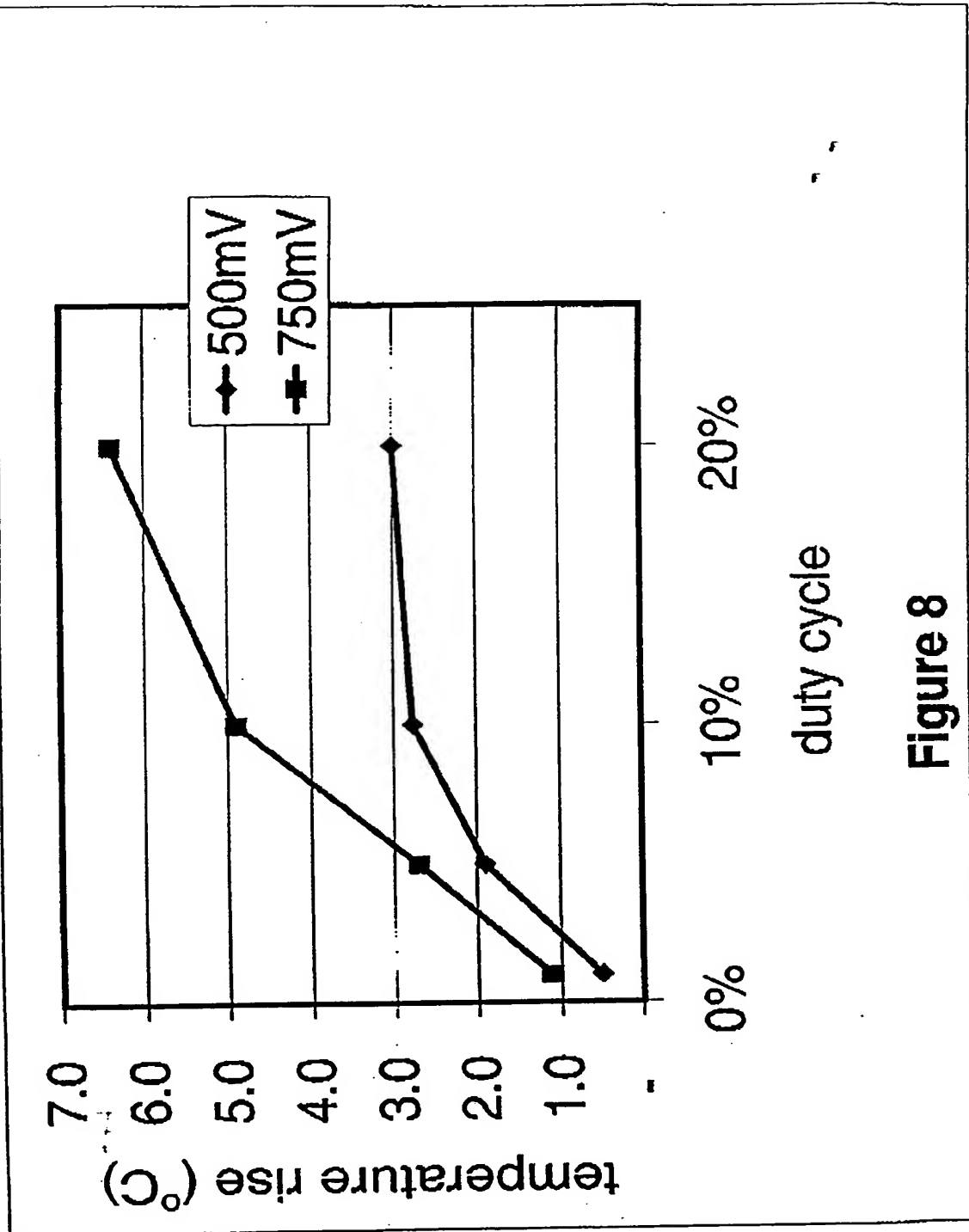


Figure 8

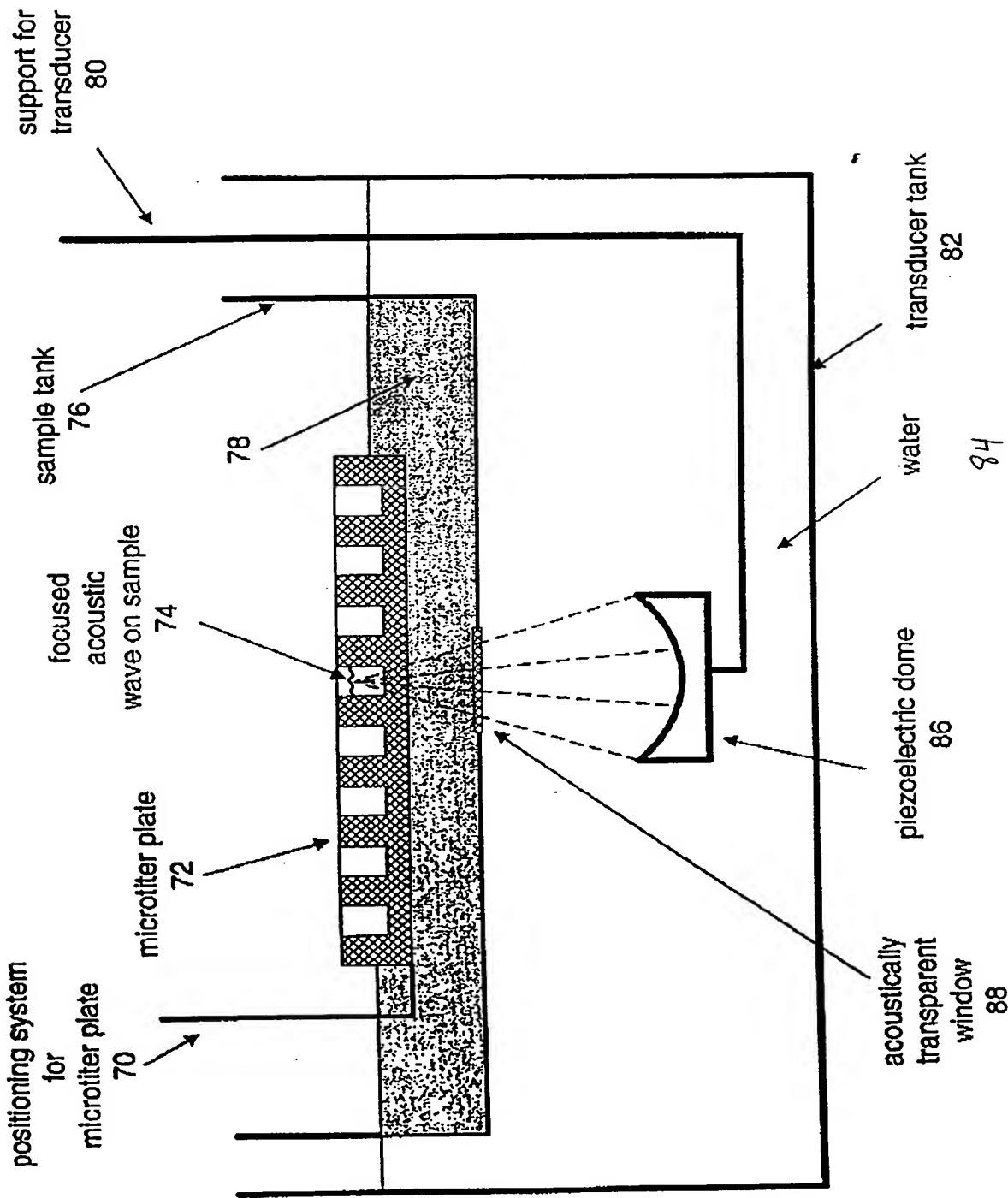


Figure 9

Figure 1b

SYSTEM SPECIFICATIONS	EXTRACTION	TRANSFORMATION	RESEARCH
PERFORMANCE: Format Treatment time Temperature	microtiter 50 sec per well	microtiter	variable variable
Acoustic parameters	bath temp control Sample temp rise	+4 to +25C variable	-10 to +40C variable
Traverse time between samples Atmosphere Control	Frequency Treatment profile Acoustic Waveform acoustic mask under plate	1.1MHz sine, shock	1.1,3.3MHz sine, shock
CONSUMABLE:	2 sec none	2 sec gas, overpressure	variable gas, overpressure
PROCEDURE:	96well PCR plate, off-the-shelf 200ul standard. Other options yes optional	24 well plate variable yes yes	variable single and multi optional
MECHANICAL: Format Water Bath	transfer to plate add fluid heat seal plate store at -80C treat at +4C place on vacuum fixture vacuum transfer to microtiter option: filter at transfer	aliquot cell culture into plate treat at controlled temperature transfer to growth medium	
	benchtop plus half-rack and chiller 1 gal distilled water	benchtop plus half rack 1 gal distilled water	cart plus rack 15 gal
	Water volume temperature control circulation pump degassing system		

Figure 12

INFORMAL DRAWING
Sheet 10 of 11

LabVIEW PROGRAMMING TASKS

GENERAL

	Extraction	Transformation
display revision level	x	x
safety interlocks	x	x
time and date stamp		x
STOP function	x	x
save configuration to file	user can reset defaults	x
operating parameters		x
protocol		x
save data to file		
treatment positions and protocols		x
temperature profile		x
error conditions		x
password protection on Vis	x	x
load configuration from file		x
user selects treatment positions	x	x

DISPLAY

User selectable treatment positions -graphical	x	x
current status		
treatment position -graphical	x	x
current protocol	by name	x
-voltage		x
-duty cycle		x
-etc		x
time to finish current sample	x	x
safety interlock status	x	x
sample temperature, graph and current temp		x
time and date		x

ULTRASONICS

initialize instrument(s)	x	x
stop function	x	x
mix and treat	predetermined	user-programmable
frequency	predetermined	x
voltage-treat	predetermined	x
voltage-mix		x
pulselength-treat	predetermined	x
pulselength-mix		x
deadtime-mix>treat		x
deadtime-treat>mix		x
Total cycles (or time)	predetermined	x
cavitation detection		optional

POSITIONING

setup and diagnostics		
initialize stepper control board	x	x
calibrate (home)	x	x
check limits (limit switches)	x	x

LabView PROGRAMMING TASKS

POSITIONING	Extraction	Transformation
setup and diagnostics		
program sample positions	predetermined	predetermined
program dithering	predetermined	x
operation		
select sample format	predetermined	
select treatment positions	predetermined	x
select treatment for each position	x	x
select dithering profile	on/off only	x
stop at limits	x	x
TEMPERATURE		
measure temperature		x
display temperature		
momentary		x
graph		x
record temperature		x
current temperature		x
record min/max		optional
save to file		optional
manage process based on temperature		
pause process to cool		
modify process		
go to next well at set temperature rise		

Figure 13